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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,874	11/27/2002	Chia-Tien Peng	9788-US-PA	5275
31561	7590	10/07/2003	EXAMINER	
JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE 7 FLOOR-1, NO. 100 ROOSEVELT ROAD, SECTION 2 TAIPEI, 100 TAIWAN			FULLER, ERIC B	
			ART UNIT	PAPER NUMBER
			1762	

DATE MAILED: 10/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/065,874	PENG, CHIA-TIEN	
	<b>Examiner</b>	<b>Art Unit</b>	
	Eric B Fuller	1762	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 April 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5, 8-14, 16, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Kanaya et al. (US 6,025,217) and Havemann et al. (US 5,747,880).

The applicant teaches in paragraphs [0005] – [0008] that the prior art conventionally provides a substrate, forms a barrier layer of silicon nitride by CVD, forming a stress buffer layer of silicon oxide on the barrier layer by CVD, thus together forming a buffer layer. An amorphous silicon layer is formed on top of the buffer layer and irradiated with an excimer laser annealing process in order to form a polysilicon layer. As it is taught that porous material layer is the improvement over the prior art, the applicant's admitted prior art does not teach to form a porous material layer.

However, Kanaya teaches that by depositing an insulating layer with a relatively low thermal conductivity before the amorphous silicon layer, the thermal energy imparted by the laser is prevented from being dissipated, which results in the polysilicon layer having more uniform grain diameters (column 4, lines 55-53; abstract). The

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insulating layer is made of silicon oxide or the like (column 4, lines 45-50). From this, one of ordinary skill in the art would recognize that the lower the thermal conductivity of the insulating layer is, the less thermal energy is dissipated, thus increasing the uniformity of the grain diameters. The reference is silent to using a porous material as the insulating layer.

However, Havemann teaches that porous silicon oxide has a lower thermal conductivity than solid silicon oxide. Porous silicon oxide obviously qualifies as "silicon oxide or the like", as taught by Kanaya. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize porous silicon oxide as an insulating layer. By doing so, the uniformity of the grain diameters is increased. To use the insulating layer on top of the stress buffer layer reads on claim 10 and to use the insulating layer as the stress buffer layer reads on claim 1. To use either configuration would have been equally obvious with the expectation of achieving similar results, as the stress barrier layer and the insulating layer are both made of silicon oxide and therefore both possess stress buffer properties.

As the thermal conductivity of porous silicon oxide is less than solid silicon oxide, it inherently must be within the applicant's claimed range.

Claims 4 and 15 rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Kanaya et al. (US 6,025,217) and Havemann et al. (US 5,747,880), as applied to claims 1 and 10 above, and further in view of Haven et al. (US 6,380,670).

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The applicant's admitted prior art in view of Kanaya and Havemann teach the limitations of claims 1 and 10, as shown above. The combined references are silent to teach the deposition method of the porous silicon oxide layer. However, Haven teaches that porous silicon oxide may be deposited by e-beam evaporation. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to deposited the porous silicon oxide by e-beam evaporation. By doing so, one would have a reasonable expectation of success, as the combined references teach to deposit the porous silicon oxide and Haven teaches a method by which this may be done.

Claims 6, 7, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Kanaya et al. (US 6,025,217) and Havemann et al. (US 5,747,880), as applied to claims 1 and 10 above, and further in view of Campion et al. (US 6,201,917 B1).

The applicant's admitted prior art in view of Kanaya and Havemann teach the limitations of claims 1 and 10, as shown above. The combined references fail to teach aluminum oxide being included in the porous layer. However, it is taught by Havemann that porous silicon oxide has less mechanical strength than solid silicon oxide and there exists a need to strengthen the porous silicon oxide (column 2, lines 50-55). Campion teaches increasing the strength of silicon oxide by doping it with aluminum oxide in the range of 100 ppm to 1000 ppm. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to dope the porous

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silicon oxide layer with aluminum oxide in the amount taught. By doing so, the mechanical strength of the porous silicon oxide is increased.

Claims 1-3, 5, 8-14, 16, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Kanaya et al. (US 6,025,217) and Numata (US 5,519,250).

The applicant teaches in paragraphs [0005] – [0008] that the prior art conventionally provides a substrate, forms a barrier layer of silicon nitride by CVD, forming a stress buffer layer of silicon oxide on the barrier layer by CVD, thus together forming a buffer layer. An amorphous silicon layer is formed on top of the buffer layer and irradiated with an excimer laser annealing process in order to form a polysilicon layer. As it is taught that porous material layer is the improvement over the prior art, the applicant's admitted prior art does not teach to form a porous material layer.

However, Kanaya teaches that by depositing an insulating layer with a relatively low thermal conductivity before the amorphous silicon layer, the thermal energy imparted by the laser is prevented from being dissipated, which results in the polysilicon layer having more uniform grain diameters (column 4, lines 55-53; abstract). The insulating layer is made of silicon oxide or the like (column 4, lines 45-50). From this, one of ordinary skill in the art would recognize that the lower the thermal conductivity of the insulating layer is, the less thermal energy is dissipated, thus increasing the uniformity of the grain diameters. The reference is silent to using a porous material as the insulating layer.

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However, Numata teaches that silica aerogel, a sol-gel derived silicon oxide, is very porous and has negligible thermal conductivity. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize silica aerogel in the above mentioned process. By doing so, the uniformity of the grain diameters is increased. To use the insulating layer on top of the stress buffer layer reads on claim 10 and to use the insulating layer as the stress buffer layer reads on claim 1. To use either configuration would have been equally obvious with the expectation of achieving similar results, as the stress barrier layer and the insulating layer are both made of silicon oxide and therefore both possess stress buffer properties.

Claims 6, 7, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Kanaya et al. (US 6,025,217) and Numata (US 5,519,250), as applied to claims 1 and 10 above, and further in view of Campion et al. (US 6,201,917 B1).

The applicant's admitted prior art in view of Kanaya and Numata teach the limitations of claims 1 and 10, as shown above. The combined references fail to teach aluminum oxide being included in the porous layer. However, Campion teaches increasing the strength of silicon oxide by doping it with aluminum oxide in the range of 100 ppm to 1000 ppm. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to dope the porous silicon oxide layer with aluminum oxide in the amount taught. By doing so, the mechanical strength of the porous silicon oxide is increased.

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**Conclusion**

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Fork et al. (US 5,733,641) is cited as being pertinent to the applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B Fuller whose telephone number is (703) 308-6544. The examiner can normally be reached on Mondays through Thursdays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck, can be reached at (703) 308-2333. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



EBF



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